“LIMNOLOGICAL STUDY OF CHIRAG SHAH DARGA LAKE AT HINGOLI”

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SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

PH.D. SYNOPSIS

Subject – Zoology Under the Faculty of Science and Technology

BY

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SYNOPSIS OF THE THESIS ENTITLED

"LIMNOLOGICAL STUDY OF CHIRAG SHAH DARGA LAKE NEAR HINGOLI"

Introduction:

The study of limnology includes aspects of the biological, chemical, physical, and geological characteristics of fresh and saline, natural and man-made bodies of water. This includes the study of lakes, reservoirs, ponds, rivers, springs, streams, wetlands, and groundwater

The present domain of life existing on earth has evolved in water hence water is a most important parameter of natural resources and all living forms. Only fresh water is of great use to all living organisms from bacteria to higher forms. About 70% of the earth's surface is covered with water contributing about 2.3 % to total freshwater and the rest is salt water (Wetzel, 1983). Of this, only 1% or less than 1% is in the form which can be utilized by organisms. Due to rapid industrialization and developmental activities, all water resources have become polluted. Under such conditions, shallow and small water bodies such as ponds, reservoirs, and lakes are more vulnerable to changes in water quality through the input of wastes and nutrients. Reservoirs have social and economic importance for human societies, as they bring industrial, agricultural and urban development, contributing with electric power and supplying water for human consumption and irrigation. A pre-impoundment survey of the fauna and flora of any water body is necessary because it provides a checklist of organisms present in the water for subsequent exploitation, conservation and sustainable management of the resources. Water quality can be determined by analyzing the physico-chemical properties of water and some biological factors. If physico-chemical properties are at its optimum level it could be ideal for all living organisms. Water quality plays a big role in plankton productivity as well as the biology of the cultured organisms and final yields (Dhawan and Karu, 2002). The faunal diversity of a reservoir represents the fish diversity, avian diversity and their abundance. That is why the study of freshwater bodies by studying the faunal diversity and other physico-chemical parameters is very important.

The present investigation of the Limnological Study of Chirag Shah Darga Lake near Hingoli City situated at 190 34'40N and 770 06'10E. It has a catchment area of 20 km. Agricultural runoff and municipal sewage are also drained in the reservoir. It is a perennial

waterbody rich with ichthyo and avian fauna. Water is mainly used for irrigation and fish culture.

Therefore, the present study is undertaken to assess the physico-chemical status and the faunal diversity of reservoir water bodies. The basic aim of the present study is to produce baseline limnological data of reservoirs, which would be helpful in the management and conservation strategies for aquaculture practices.

2. Review of Literature and Development in the Subject (Previous Work Done in the Relevant Area):

Many workers have been working in India and abroad for the study of limnology, fishery and aspects of lentic water bodies. Limnology as it flourished as a different branch of science, it chiefly concerned with the ecology of freshwater bodies. Many studies were conducted on the physicochemical characteristics of different water bodies, particularly in lakes, dams, and reservoirs an important water resource. Physico-chemical parameters for testing of water A review is carried by Patil P.N. and Sawant D.V. Avinash V. and Karne Studied on Physico-Chemical Characteristics of Freshwater Bodies in Khatav Tahsil, Maharashtra.

The study of zooplankton and its diversity has been a fascinating subject for a long time. In the last two decades, the study of biology, ecology and toxicology much attention has been paid in the tropical countries towards study of zooplankton and their important role in the rapidly emerging concepts of environmental management like Environmental Impact Assessment (EIA),bio indication of pollution and biological monitoring (Salve and Hiware, 2010). Zooplankton is a good indicator for detecting water quality changes because they are strongly affected by environmental conditions and respond quickly to changes in water quality within the water bodies. Zooplankton is the intermediate link between the phytoplankton and fish. Hence, in the present state, qualitative and quantitative studies of zooplankton are of great importance and value. Silva and Davias (1986) according to them, the amount of dissolved solutes play an important role in directly or indirectly controlling the growth of zooplankton.

Ichthyofaunal Diversity has the potential to substantially augment the inland fish production in the country. For to formulate sound of scientific management, it measures for augmenting fish production in reservoirs thus this information on the fish yield potential is necessary which would help in setting targets for such water bodies. Many studies were undertaken to

know the important role of reservoirs in fish production in India and abroad. Several workers studied ichthyo fauna. Moyle, P.B. and Moyle, P. R., (1995): Endangered fishes and economic international obligations. Ciftci, Y. and Okumu. I., (2002): Fish Population Genetics and Applications of Molecular Markers to fisheries and Aquaculture: I- Basic Principles of Fish Population Genetics. Kalyankar, V. B.; Nalage. D.N.; Dhondage. T.B.; Akhare. S.S.; and Jamdar. S.V. (2012): Study of Fish Biodiversity from Lower Dudhana Project at Parbhani District, India.

Study of avian diversity is very essential ecological tools, that act as an important biological indicator to evaluate different habitats both quantitatively and qualitatively. Nowadays, avifaunal diversity has been decreasing and destruction of natural habits by interruption of human beings and by natural disasters. Many species of birds may be forced to inhabit in urban areas also constrained to breed there. Birds are a very important animal group of an ecosystem and it maintains a trophic level. Several authors since early 20th and 21st century have documented the avifaunal diversity in India including by Ali (1932), Ali (1945 1996), Abdulali (1945, 1953).

3. Objectives of research:

Studies on limnological characteristics in Siddheshwar reservoir.

1.Monthly analysis of physico-chemical Parameters of water.

2.Study Zooplankton diversity.

3. Study of ichthyofauna diversity.

4. Study of avian faunal diversity.

4. Methodology:

1. Locate the site, and morphometric features of the reservoir based on topography, three sampling stations will be established.

2. Physico-chemical parameters of water analysis will be analyzed by Standard Methods for the Examination of Water and Wastewater ISBN: 978-0-87553-299-8, Publisher: APHA, AWWA, WEF 2022. APHA, (1980). Standard methods for the examination of water and wastewater, 15th edition. APHA, New York, USA.

3. Collection and identification of zooplankton from monthly collected water samples.

4. Fish collection, preservation and identification of fishes.
5. Birds will be observed during the study period.

Importance of Study / Society Application: -

I. National Status

In conclusion, the study of zooplankton in freshwater ecosystems is not only vital for understanding aquatic ecology but also for informing conservation efforts and managing water resources sustainably. Their role as indicators of environmental change makes them a key focus in ecological research. The study of physico-chemical parameters of water is crucial for understanding aquatic ecosystems and assessing their health and sustainability. Here are some key ecological importance of this research:

Water Quality Assessment: By analyzing parameters such as pH, dissolved oxygen, turbidity, temperature, and conductivity, researchers can assess the water quality. This information is essential for determining the suitability of water for various uses, including drinking, agriculture, and habitat for aquatic life.

Ecosystem Health: Physico-chemical parameters provide insights into the ecosystem's health. For instance, higher levels of nitrates or phosphates can indicate nutrient pollution leading to harmful algal blooms, which can deplete oxygen levels and harm aquatic organisms.

Biodiversity Support: Different aquatic organisms thrive under specific physico-chemical conditions. Understanding these parameters helps in the conservation of biodiversity by identifying critical habitats and the specific requirements of various species.

Impact of Human Activity: Monitoring changes in physico-chemical properties can reveal the impact of human activities, such as industrial discharges, agricultural runoff, and urbanization on water bodies. This awareness is critical for developing effective management and remediation strategies.

Climate Change Indicators: Changes in water temperature and chemical composition can serve as indicators of climate change effects in aquatic systems. Long-term studies can help

predict shifts in species distributions and ecosystem dynamics as the climate continues to evolve.

Suresh M Kumbar and Abhijit B Ghadage studied Preliminary study on avian fauna of the Krishna River basin Sangli District, Western Maharashtra, India, Saeed Abbas et. al. Avian Diversity in Central Karakoram National Park, Gilgit-Baltistan, Rohtash Chand Gupta studied Documentation of avian diversity of Khaparwas Bird Sanctuary in Jhajjar district in Haryana, India. Suresh M Kumbar, Abhijit B Ghadage,Preliminary study on avian fauna of the Krishna River basin Sangli District, Western Maharashtra, India. Number of researchers are involved in this study. Limnology, the study of inland waters, is a vibrant field of research with significant international importance. Its status can be highlighted through various key aspects:

International status

Global Collaboration: There has been a marked increase in international collaborations among limnologists. Conferences, workshops, and research projects frequently bring together scientists from different countries to share knowledge, methodologies, and findings, fostering a global approach to freshwater research.

Funding and Support: Various international organizations, such as the International Association of Theoretical and Applied Limnology (SIL) and the Global Water Partnership (GWP), provide funding and support for limnological research. This financial backing allows for enhanced research capabilities, including long-term studies and the monitoring of critical freshwater ecosystems.

Research Focus Areas: Current international limnological research trends focus on issues such as climate change impacts on freshwater bodies, water quality assessment, biodiversity loss in inland waters, and the effects of anthropogenic activities on aquatic ecosystems. Research is increasingly interdisciplinary, combining biology, chemistry, hydrology, and environmental science to address complex issues.

Data Sharing and Technology: Advances in technology and data science have transformed limnological research. The use of satellite remote sensing, geographic information systems (GIS), and emerging monitoring technologies allows researchers to gather and analyze vast

amounts of data on freshwater ecosystems. International databases and platforms facilitate data sharing, enabling a more comprehensive understanding of global trends.

Policy Influence: Limnological research has a growing influence on water management policies at national and international levels. Policymakers rely on scientific findings to develop strategies for sustainable water use, conservation, and restoration efforts, especially in regions facing significant water scarcity and pollution challenges.

Educational Initiatives: There is a strong emphasis on training and education in limnology, evidenced by numerous academic programs and professional development courses worldwide. Enhancing knowledge among new generations of scientists is seen as critical for addressing future freshwater challenges.

By studying the physico-chemical parameters of water, researchers contribute to a deeper understanding of aquatic ecosystems, guiding conservation efforts and promoting sustainable management practicesSignificance of the Study

Birds provide a terrific doorway into nature and scientific study. They are easy to see and study. They engage in fascinating behaviors and play important roles in the ecosystems that sustain life. Birds are excellent indicators of environmental health. Their changing populations often provide clues to the overall health of their habitat. Go to our Conservation section for more information.

5. Proposed work plan/Formulation and structure of study :

(Year wise plan of work and targets to achieved)

First Year (2025)

1.Survey of Literature

2.3 Sites will be fixed for water sample collection

3. Physicochemical parameters will be analyzed from collected water samples with standard prescribed methods

4. Zoopanktons identification from collected water samples

5.Observation of Birds with Biacular telescope

6.Study of Avian Fauna diversity.

Second Year (2026)

1.Survey of Literature

2.3 Sites will be fixed for water sample collection

3. Physicochemical parameters will be analyzed from collected water samples with standard prescribed methods

4. Zoopanktons identification from collected water samples

5.Observation of Birds with Biacular telescope

6.Study of Avian Fauna diversity..

Third Year (2028)

1. Physicochemical parameters will be analyzed from collected water samples with standard prescribed methods

2. Zooplanktons identification from collected water samples

3.. Observation of Birds with Biacular telescope

4. Study of Avian Fauna diversity.

5. Literature survey.

6. Data tabulation.

7..Writing work

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Signature **Signature**

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Date: 16/12/2024

Consent Letter

To,

Dean

Faculty of Science & Technology and Chairman, RAC

Subject: Consent for Research Guidance

Reference: PET2022/alloc/2022-23/1932

Respected sir,

Concerning above cited subject I hereby request that, the Research Committee allocate research student Ms Ashwini Kabirdas Rathod. I am giving consent as a research supervisor.

Thanking You